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ORIGINAL RESEARCH

Predictive Value of the Triglyceride-Glucose Index for Metabolic-Associated Fatty Liver Disease in Individuals with Different Metabolic Obese Phenotypes

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Objective: To investigate the relationship between triglyceride-glucose (TyG) index and metabolic-associated fatty liver disease (MAFLD), and to evaluate the predictive value of the TyG index for MAFLD in individuals with different metabolic obese phenotypes. The aim is to provide a novel approach for the screening and early diagnosis of MAFLD in the general population.

Methods: A total of 2614 subjects were recruited and classified into four categories of metabolic obese phenotypes based on their body mass index (BMI) and metabolic status. Basic data and general blood indices were collected and analyzed. The TyG index was calculated, and an abdominal ultrasound was performed to detect the presence of fatty liver disease. The aforementioned data were then subjected to statistical analysis.

Results: The TyG index was significantly higher in the MAFLD group than in the non-MAFLD group ($P < 0.001$). Furthermore, the TyG index in the metabolically unhealthy and obese (MUO) group and the metabolically unhealthy normal weight (MUNW) group was significantly higher than that in the metabolically healthy and obese (MHO) group and the metabolically healthy normal weight (MHNW) group ($P < 0.001$). The area under the curve (AUC) of the TyG index for predicting MAFLD in the MHNW, MUNW, MHO, and MUO groups was 0.765, 0.766, 0.659, and 0.650, respectively. The critical values were 8.575, 9.075, 8.795, and 9.165, respectively.

Conclusion: The TyG index is a reliable predictor of MAFLD risk, exhibiting a higher predictive ability for the risk of developing MAFLD in individuals with normal BMI compared to those with abnormal BMI. The findings of this study lend support for the use of the TyG index as a screening tool and for guiding subsequent management of patients with MAFLD.

Keywords: TyG index, MAFLD, metabolic obese phenotype, screening, predictive value

Introduction

Non-alcoholic fatty liver disease (NAFLD) is defined by hepatic steatosis as the primary pathological manifestation, which can progress to cirrhosis and hepatocellular carcinoma.[1,2] Recent epidemiologic surveys have estimated the global prevalence of NAFLD to be approximately 25%, which is projected to increase to 33.5% by 2030.[3,4] NAFLD is expected to become the leading cause of end-stage liver disease in the coming decades and to exert significant economic pressure on healthcare systems worldwide.[5] It is therefore important to identify individuals at risk of developing NAFLD as early as possible in order to protect public health. The development of simple and effective diagnostic tools will facilitate the early detection and management of the NAFLD population.

In recent years, the intrinsic limitations of the term "non-alcoholic" have been increasingly acknowledged. The term "non-alcoholic" places undue emphasis on the presence or absence of alcohol use, while failing to acknowledge the significance of metabolic risk in the progression of NAFLD. Consequently, in 2020, an international panel of experts

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renamed NAFLD to metabolically associated fatty liver disease (MAFLD).[6] MAFLD is closely associated with a variety of chronic diseases, including metabolic syndrome, type 2 diabetes, obesity, dyslipidemia, and cardiovascular disease.[7] The precise pathogenesis remains unclear. However, it is widely accepted that insulin resistance (IR) is a pivotal factor in the development of MAFLD.[8] Recently, some scholars have identified a simple indicator, the triglyceride-glucose (TyG) index, which effectively reflects IR and may serve as a simple and inexpensive alternative marker for IR.[9]

In consideration of the aforementioned theories, some scholars propose that the TyG index can serve as a straightforward and efficacious marker for predicting MAFLD.[10–12] However, the majority of the populations included in these studies are diseased populations, and there is a paucity of screening studies for the general population. Moreover, no study has yet conducted a metabolic obese phenotype subgroup analysis of the study population. It is well established that obesity and metabolic disorders are typical clinical features and important risk factors in patients with MAFLD. It is important to note, however, that not all individuals with obesity are accompanied by metabolic disorders, and not all individuals with a normal body mass index (BMI) are metabolically healthy. Accordingly, this study classified the study population into four metabolic obese phenotypes based on BMI and metabolic status, examined the correlation between the TyG index and MAFLD in different metabolic obese phenotypes, and evaluated the predictive capacity of the TyG index for the risk of MAFLD in different metabolic obese phenotypes. The objective is to present novel insights for the screening and early diagnosis of MAFLD in the general population.

Methods

Study Population

The study population consisted of adults aged 18 and above who received a routine physical examination at the physical examination center of Hebei General Hospital between 2022 and 2023. The following variables were investigated via questionnaires: age, sex, medical history, family history, smoking status, and alcohol consumption. The following exclusion criteria were employed: (1) viral hepatitis, autoimmune liver disease, and other chronic liver diseases; (2) chronic kidney disease, blood system diseases, and malignant tumors; and (3) male alcohol consumption of ≥140 g/week or female alcohol consumption of ≥70 g/week. (4) pregnant or lactating women, (5) patients receiving hepatotoxic drugs (such as methotrexate, amiodarone, corticotherapy, chemotherapy, hormone therapy), and (6) patients with incomplete data. A total of 2614 individuals were enrolled in the study, comprising 2013 men and 601 women. The study was approved by the Ethics Committee of Hebei General Hospital (Ethics No.2024-LW-0225) and was conducted in accordance with the principles set forth in the Declaration of Helsinki. All subjects who participated in this study were informed about the study and signed a consent form.

Data Collection and Index Measurement

All subjects completed a questionnaire under the supervision of a duly qualified medical professional. The questionnaire included inquiries pertaining to demographic information, medical history, family history, and other pertinent data. The subjects' height and weight were measured in the absence of footwear and in accordance with the standard protocol for such measurements, namely, while wearing light indoor clothing. The waist circumference (WC) was calculated in subjects who were standing, with the measurement taken midway between the lower edge of the costal arch and the top of the iliac crest. BMI was calculated using the following formula: weight (in kilograms) divided by height squared (in meters). Following a 10-minute period of rest and quietude, blood pressure was measured on three occasions with an automated sphygmomanometer, with a one-minute interval between each measurement. The mean of the three readings was then calculated to represent the subject's blood pressure.

Following an overnight fasting period of between 8 and 12 hours, 4 mL of blood samples were collected from the elbow vein of each subject in the early morning. All samples were placed in a vertical position at room temperature (22–24 °C) for 30 minutes and then centrifuged (approximately 5000 rpm) for 5–10 minutes to separate the plasma. Subsequently, the triglyceride (TG), total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), and fasting plasma glucose (FPG) levels were then quantified by an automatic biochemical analyzer. The TyG index was calculated according to the following formula: $\text{TyG} = \ln[\text{fasting triglycerides (mg/dL)} \times \text{FPG (mg/dL)}/2]$.[13]

Metabolic Obese Phenotype

In accordance with the diagnostic criteria established by the Chinese Diabetes Society (CDS) in 2020, metabolic syndrome is considered to have three or more of the following: (1) Central obesity: WC ≥85 cm in women and ≥90 cm in men, (2) Hyperglycemia: FPG ≥6.1 mmol/L or 2 h post glycemic load blood glucose ≥7.8 mmol/L or those who have been diagnosed and treated for diabetes mellitus, (3) Hypertension: blood pressure ≥130/85 mmHg or those who have been identified and treated for hypertension, (4) TG ≥1.70 mmol/L, (5) HDL-C <1.04 mmol/L.

In accordance with the World Health Organization (WHO) criteria, subjects with a BMI <25.0 kg/m^2 were defined as having normal body mass, and those with a BMI ≥25.0 kg/m^2 were defined as having abnormal body mass.

The study population was classified according to metabolic syndrome and BMI, resulting in the following four groups: (1) Metabolically healthy normal weight (MHNW), individuals with a BMI <25 kg/m^2 and without metabolic syndrome. (2) Metabolically unhealthy normal weight (MUNW), individuals with a BMI <25 kg/m^2 and metabolic syndrome. (3) Metabolically healthy and obese (MHO), BMI ≥ 25 kg/m^2 without metabolic syndrome. (4) Metabolically unhealthy and obese (MUO), BMI ≥ 25 kg/m^2 with metabolic syndrome.

Abdominal Ultrasound

Abdominal ultrasound is a diagnostic tool used to evaluate MAFLD. The diagnosis of MAFLD is made by an experienced ultrasound technician who is blinded to the subject's identity. This is based on the observation of four specific features of the ultrasound image: liver brightness, liver and kidney echo contrast, vascular blurring, and depth of attenuation.[14]

Statistical Analysis

The statistical analysis was conducted using the SPSS 21.0 software. Normally distributed measures were expressed as Mean ±SD and analyzed using analysis of variance (ANOVA) for multi-group comparisons. Non-normally distributed measures were expressed as M (P25, P75) and analyzed using the rank-sum test for inter-group comparisons. Categorical variables were expressed using numbers or percentages, and the chi-square test was used for inter-group comparisons. The odds ratio (OR) and 95% confidence interval (CI) of the risk of MAFLD in each TyG quartile group were calculated by logistic regression analysis. Furthermore, a receiver operating characteristic (ROC) curve was constructed to assess the diagnostic efficacy of TyG in predicting MAFLD. $P<0.05$ was considered statistically significant.

Results

Comparative Analysis of Baseline Data Between Non-MAFLD and MAFLD Groups

The MAFLD group exhibited significantly higher BMI and WC values than the non-MAFLD group ($P < 0.001$). Additionally, the proportion of males and the proportion of the MUNW, MHO, and MUO populations were also higher in the MAFLD group than in the non-MAFLD group. Conversely, the proportion of the MHNW population was lower in the MAFLD group than in the non-MAFLD group ($P < 0.001$). Furthermore, the levels of TG, TC, LDL-C, FPG, TyG, systolic blood pressure (SBP) and diastolic blood pressure (DBP) were significantly elevated in the MAFLD group relative to the non-MAFLD group, whereas the level of HDL-C was significantly diminished ($P < 0.001$) (Table 1).

Comparative Analysis of Baseline Data of People with Different Metabolic Obese Phenotypes

The MUO group exhibited the highest proportion of males and proportion of MAFLD, followed by the MHO, MUNW, and MHNW groups ($P < 0.001$). The order of BMI and WC from high to low was MUO group, MHO group, MUNW group, and MHNW group. The SBP and DBP were observed to be highest in the MUO group, followed by the MUNW group, the MHO group, and the MHNW group. The levels of TG, TC, LDL-C, FPG, and TyG in the MUO and MUNW groups were significantly higher than those in the MHO and MHNW groups ($P < 0.001$). Furthermore, the MUO group exhibited lower levels of HDL-C than the other three groups ($P < 0.001$) (Table 2).

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Table 1 Comparative Analysis of Baseline Data Between Non-MAFLD and MAFLD Groups

	Non-MAFLD (n= 1375)	MAFLD (n= 1239)	Statistical Value	*P* value
Gender, n (%)				
Males	947 (68.90%)	1066 (86.00%)	108.45	<0.001
Females	428 (31.10%)	173 (14.00%)		
Metabolic obese phenotype, n (%)				
MHNW	808 (58.80%)	154 (12.40%)	682.00	<0.001
MUNW	56 (4.10%)	57 (4.60%)		
MHO	321 (23.30%)	401 (32.40%)		
MUO	190 (13.80%)	627 (50.60%)		
Age (years)	51 (41, 58)	50 (41, 57)	−1.42	0.157
BMI (kg/m^2)	24.16 (22.09, 26.09)	27.34 (25.61, 29.41)	−26.34	<0.001
WC (cm)	86 (79, 93)	95 (90, 101)	−24.48	<0.001
TG (mmol/L)	1.15 (0.83, 1.57)	1.86 (1.36, 2.73)	−23.09	<0.001
TC (mmol/L)	5.08 (4.41, 5.77)	5.27 (4.63, 5.97)	−5.27	<0.001
LDL-C (mmol/L)	3.17 (2.68, 3.68)	3.35 (2.90, 3.87)	−6.66	<0.001
HDL-C (mmol/L)	1.33 (1.16, 1.54)	1.18 (1.04, 1.34)	−15.12	<0.001
FPG (mmol/L)	5.36 (5.07, 5.75)	5.76 (5.30, 6.45)	−14.09	<0.001
TyG index	8.55 (8.19, 8.88)	9.12 (8.76, 9.54)	−24.25	<0.001
SBP(mmHg)	120 (110, 132)	127 (118, 138)	−11.08	<0.001
DBP(mmHg)	79 (72, 86)	85 (78, 92)	−12.85	<0.001

Table 2 Comparative Analysis of Baseline Data of People with Different Metabolic Obese Phenotypes

	MHNW (n= 962)	MUNW (n= 113)	MHO (n= 722)	MUO (n= 817)	Statistical value	*P* value
Gender, n (%)						
Males	598 (62.20%)	88 (77.90%)	597 (82.70%)	730 (89.40%)	203.25	<0.001
Females	364 (37.80%)	25 (22.10%)	125 (17.30%)	87 (10.60%)		
MAFLD, n (%)						
Yes	154 (16.00%)	57 (50.40%)	401 (55.50%)	627 (76.70%)	682.00	<0.001
No	808 (84.00%)	56 (49.60%)	321 (44.50%)	190 (23.30%)		
Age (years)	49.50 (38.75, 56.25)	57 (48.5, 62)	49 (40, 56)	51 (42, 58)	55.88	<0.001
BMI (kg/m^2)	22.95 (21.30, 24.09)	23.83 (23.04, 24.49)	26.93 (25.91, 28.72)	28.03 (26.66, 30.06)	1932.30	<0.001
WC (cm)	82 (76, 87)	90 (87, 92.5)	93 (89, 99)	98 (93.5, 103)	1425.82	<0.001
TG (mmol/L)	1.08 (0.81, 1.49)	2.02 (1.49, 2.84)	1.33 (0.99, 1.65)	2.13 (1.66, 3.05)	748.03	<0.001
TC (mmol/L)	5.08 (4.44, 5.73)	5.38 (4.59, 6.48)	5.20 (4.55, 5.86)	5.25 (4.61, 5.97)	21.31	<0.001
LDL-C (mmol/L)	3.16 (2.68, 3.63)	3.37 (2.85, 4.28)	3.29 (2.81, 3.81)	3.35 (2.87, 3.84)	37.49	<0.001
HDL-C (mmol/L)	1.38 (1.19, 1.59)	1.23 (0.99, 1.44)	1.25 (1.14, 1.41)	1.13 (0.99, 1.31)	354.91	<0.001
FPG (mmol/L)	5.32 (5.04, 5.64)	6.30 (5.57, 7.66)	5.43 (5.12, 5.76)	6.12 (5.48, 7.03)	502.79	<0.001
TyG index	8.47 (8.14, 8.82)	9.28 (9.01, 9.69)	8.69 (8.38, 8.92)	9.28 (8.99, 9.66)	961.61	<0.001
SBP(mmHg)	116 (108, 127)	131 (121.5, 141.5)	122 (114, 131)	132 (123, 142)	423.26	<0.001
DBP(mmHg)	77 (71, 83.25)	86 (81, 91.5)	80 (74, 87)	88 (82, 94.5)	479.71	<0.001

Multivariate Logistic Regression Analysis of the Risk of TyG Index and MAFLD in Subjects with Different Metabolic Obese Phenotypes

The TyG index of the MHNW, MUNW, MHO, and MUO groups was divided into four subgroups by quartiles in the order of Q1, Q2, Q3, and Q4 groups, respectively, with the Q1 group designated as the reference. Model 1 was not adjusted for potential confounding variables, whereas Model 2 was adjusted for such variables, including age, gender, BMI, WC, TG, TC, LDL-C, HDL-C, FPG, SBP, and DBP.

Table 3 Multivariate Logistic Regression Analysis of the Risk of TyG Index and MAFLD in Subjects with Different Metabolic Obese Phenotypes

	MHNW		MUNW		MHO		MUO	
	OR (95% CI)	***P* value**	**OR (95% CI)**	***P* value**	**OR (95% CI)**	***P* value**	**OR (95% CI)**	***P* value**
Model 1								
Q1	1.00	–	1.00	–	1.00	–	1.00	–
Q2	2.306 (1.021, 5.205)	0.044	8.000 (2.188, 29.249)	0.002	1.846 (1.224, 2.783)	0.003	1.807 (1.184, 2.758)	0.006
Q3	5.578 (2.655, 11.720)	<0.001	6.400 (1.795, 22.823)	0.004	2.598 (1.691, 3.993)	<0.001	2.483 (1.586, 3.886)	<0.001
Q4	14.475 (7.063, 29.662)	<0.001	25.200 (5.975, 106.289)	<0.001	4.614 (2.949, 7.219)	<0.001	4.337 (2.583, 7.281)	<0.001
Model 2								
Q1	1.00	–	1.00	–	1.00	–	1.00	–
Q2	1.277 (0.548, 2.976)	0.571	9.301 (2.407, 35.935)	0.001	1.545 (0.974, 2.452)	0.064	1.800 (1.152, 2.815)	0.010
Q3	2.156 (0.954, 4.870)	0.065	7.921 (1.876, 33.438)	0.005	2.086 (1.239, 3.510)	0.006	2.450 (1.502, 3.998)	<0.001
Q4	3.036 (1.181, 7.806)	0.021	31.986 (3.205, 319.209)	0.003	3.213 (1.577, 6.544)	0.001	4.695 (2.319, 9.503)	<0.001

In the MHNW group, the risk of MAFLD in the Q2, Q3, and Q4 groups was 2.306, 5.578, and 14.475 times higher, respectively, than that in the Q1 group (P=0.044, P<0.001, P<0.001). After adjusting for potential confounding variables, the risk of MAFLD in the Q4 group remained 3.036 times higher than that in the Q1 group (P = 0.021). In the MUNW group, the risk of MAFLD in groups Q2, Q3, and Q4 was 8.000, 6.400, and 25.200 times higher, respectively, than that in group Q1 (P=0.002, P=0.004, and P<0.001). After adjusting for potential confounding variables, the risk of MAFLD in groups Q2, Q3, and Q4 remained significantly elevated, at 9.301, 7.921, and 31.986 times the level observed in group Q1, respectively (P = 0.001, P = 0.005, P = 0.003). In the MHO group, the risk of MAFLD in groups Q2, Q3, and Q4 was 1.846, 2.598, and 4.614 times higher, respectively, than that in group Q1 (P = 0.003, P < 0.001, P < 0.001). After adjusting for potential confounding variables, the risk of MAFLD in groups Q3 and Q4 remained 2.086 and 3.213 times higher, respectively, than that in group Q1 (P = 0.006, P = 0.001). In the MUO group, the risk of MAFLD in groups Q2, Q3, and Q4 was 1.807, 2.483, and 4.337 times higher, respectively, than that in group Q1 (P = 0.006, P < 0.001, P < 0.001). After adjusting for potential confounding variables, the risk of MAFLD in groups Q2, Q3, and Q4 remained significantly elevated, at 1.800, 2.450, and 4.695 times the level observed in group Q1, respectively (P=0.010, P<0.001, P<0.001) (Table 3).

ROC Curve of TyG Index Prediction of MAFLD Risk in Subjects with Different Metabolic Obese Phenotypes

ROC curves were constructed for the TyG index in the four groups of MHNW, MUNW, MHO, and MUO to predict the risk of MAFLD occurrence (Figure 1). The findings indicated that the TyG index demonstrated a degree of predictive efficacy for the incidence of MAFLD across all four categories of metabolic obesity phenotypes. The area under the ROC curves (AUC) for the TyG index in forecasting the occurrence of MAFLD in the four groups of MHNW, MUNW, MHO, and MUO were 0.765, 0.766, 0.659, and 0.650, and the critical values were 8.575, 9.075, 8.795, and 9.165, respectively (Table 4).

Discussion

The early identification of MAFLD represents a significant challenge, given that the majority of patients with this condition are asymptomatic. Although liver biopsy remains the gold standard for diagnosing MAFLD, it is not suitable for large-scale epidemiologic investigations due to its invasiveness, poor acceptability, cost, and sampling variability.[15] In contrast, the mathematical model of the TyG index, derived in 2016 by Simental et al for the assessment of IR, is well suited for large-scale epidemiological investigations, as the calculation of the TyG index requires only TG and FPG.[16] Subsequently, studies examining the correlation between the TyG index and the incidence of MAFLD.[17] However, investigations assessing the capacity of the TyG index to predict MAFLD in populations with diverse metabolic obese phenotypes remain scarce.

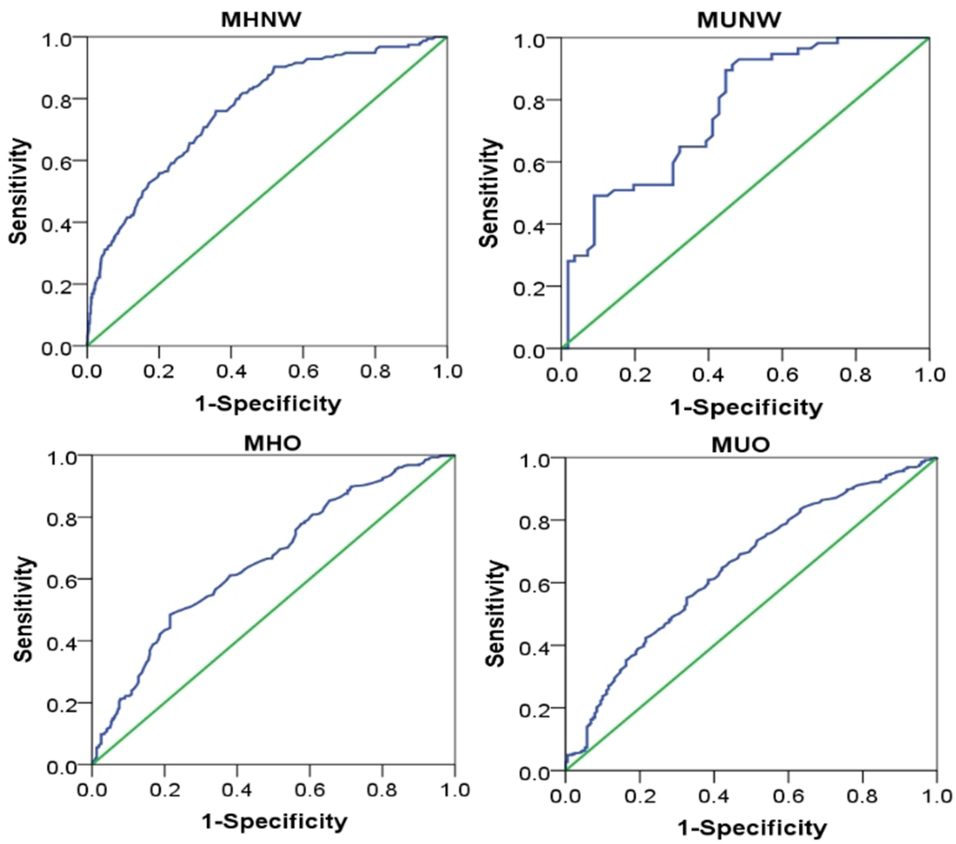

Figure 1 ROC curve for the TyG index predicting MAFLD risk in the MHNW, MUNW, MHO and MUO cohorts.

Although MAFLD is more prevalent among obese individuals, it is not uncommon to identify non-obese patients with MAFLD. Epidemiological data indicate that 10% to 30% of non-obese individuals exhibit evidence of hepatic steatosis.[18,19] It is notable that non-obese MAFLD appears to be more prevalent in Asian populations than in other ethnic groups.[20] The hypothesis that elevated BMI increases the risk of metabolic diseases has been proposed; however, it is important to note that not all individuals with overweight or obesity will develop risk factors or health complications. Depending on the BMI definition of obesity, there may be "metabolically healthy" or "fit for fat" obesity. The regional distribution of body fat may prove to be a more significant factor than the amount of adipose tissue when considering the relationship between obesity and health outcomes.[21]

The present study involved a subgroup analysis of metabolic obese phenotypes in the Chinese population, with the findings revealing a positive correlation between the TyG index and the risk of MAFLD, regardless of metabolic obese phenotypes. The TyG index proved to be an effective predictor of the risk of MAFLD in individuals with diverse metabolic obese phenotypes. Furthermore, the TyG index demonstrated superior predictive capacity for the risk of

Table 4 ROC Curve of TyG Index Prediction of MAFLD Risk in Subjects with Different Metabolic Obese Phenotypes

		AUC	95% CI	Sensitivity (%)	Specificity (%)	Maximum Jordonindex	Cut-of value
TyG index	MHNW	0.765	0.724~0.805	76.0	64.2	0.402	8.575
	MUNW	0.766	0.680~0.853	89.5	55.4	0.449	9.075
	MHO	0.659	0.620~0.699	48.4	78.5	0.269	8.795
	MUO	0.650	0.606~0.694	64.8	57.9	0.227	9.165

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MAFLD in individuals with normal body mass compared to those with abnormal body mass. These findings are consistent with those previously reported by Wang et al, who found that the TyG index was significantly associated with a higher incidence of MAFLD in a subgroup of lean individuals (BMI < 23 kg/m²) and that the TyG index predicted MAFLD risk more positively in lean subjects than in obese subjects.[22]

The potential explanations for the correlation between the TyG index and MAFLD are as follows: the TyG index was calculated from TG and FPG. As a vital metabolic organ, the liver plays a pivotal role in regulating glycolipid metabolism. Additionally, IR and impaired glycolipid metabolism are significant contributing factors to the development and progression of MAFLD.[23–25] TG is synthesized from free fatty acids (FFA), which are produced by the liver. In the event of an excess of energy, which results in an increase in FFA, the surplus FFA is transported through the bloodstream to the liver and subsequently undergoes synthesis into fat. This ultimately results in the accumulation of excess lipids within the liver, which in turn leads to the development of MAFLD.[26]

In this study, we observed that the optimal critical values of the TyG index for diagnosing MAFLD in the MHNW, MUNW, MHO, and MUO Chinese populations were 8.575, 9.075, 8.795, and 9.165, respectively. These values are in close alignment with the critical values derived from other previous related studies in Chinese populations. In a separate study, Zhang et al identified an optimal critical value of 8.50 for the TyG index in predicting MAFLD,[27] while Guo et al reached an optimal critical value of 8.70 for the TyG index in predicting MAFLD.[28] Furthermore, Chen et al determined that the optimal critical value for the TyG index to predict the risk of MAFLD in the Chinese elderly population was 8.63.[29]

This study has several advantages, including: Firstly, the subjects were selected from the general physical examination population, rather than a disease population, which is more representative of the general population. Secondly, the data were analyzed using routine measurements from a standard health physical examination, thereby obviating the need for additional examinations or tests. This approach is straightforward, non-invasive, and readily accepted by participants. Thirdly, the study conducted subgroup analyses based on the metabolic obese phenotypes of the subjects and explored the TyG index in greater detail to predict the risk of developing MAFLD in individuals with varying obesity metabolic statuses. It is imperative to acknowledge the limitations of this study. Firstly, MAFLD was identified exclusively through plain ultrasonography, which has limited sensitivity and is unable to accurately detect steatosis in instances where hepatic fat infiltration is less than 10%.[30] In future studies, semi-quantitative ultrasonography may prove to be a more reliable method for screening for MAFLD.[31] Secondly, as this study is a cross-sectional study, it is not possible to derive a causal relationship. Finally, it is important to note that the present study was conducted exclusively with a Chinese population, which raises the question of whether the findings can be generalized to other ethnic groups. It would be advantageous for future research to incorporate larger, multicenter studies.

Conclusions

In conclusion, the results of this study indicate that the TyG index can be utilized as an effective marker for noninvasive and straightforward screening of MAFLD, and is a reliable predictor of MAFLD risk. Moreover, the TyG index exhibited superior predictive capacity for MAFLD risk in individuals with normal body mass compared to those with abnormal body mass. In the MHNW, MUNW, MHO, and MUO Chinese populations, a TyG index exceeding 8.575, 9.075, 8.795, and 9.165, respectively, indicates the necessity for lifestyle modifications or pharmacological intervention to prevent the development of MAFLD or even liver fibrosis. In light of these findings, it can be concluded that the TyG index is a valuable tool for the screening and subsequent management of MAFLD patients.

Data Sharing Statement

All data used to support the findings of this study are available on request from the corresponding author.

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Disclosure

The authors declare no competing interests in this work.

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